NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

A Case Study of the United States Navy's Enterprise Resource Planning System

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June 2006

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY ***(Leave blank)***	**2. REPORT DATE** June 2006	**3. REPORT TYPE AND DATES COVERED** MBA Professional Report	
4. TITLE AND SUBTITLE A Case Study of the United States Navy's Enterprise Resource Planning System			**5. FUNDING NUMBERS** **N/A**
6. AUTHOR(S) Harold Carver, William Jackson			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			**12b. DISTRIBUTION CODE**

13. ABSTRACT (maximum 200 words)

This project was conducted as a case analysis of the Navy's ERP efforts, from the decision to adopt ERP up to the current Navy ERP program. The objective of the report was to develop a single-source document which provides the reader with enough information to have an understanding of the ERP efforts within the Navy. This study analyzes the history of ERP systems and the lessons learned from the commercial sector. The revolution in business affairs motivated the Navy to adopt ERP systems in 1997 and an initial program consisting of four pilots was initiated at major shore commands. Although the Navy viewed the pilots as a success, Congress criticized the pilots as a waste of one billion dollars. The Navy is continuing with the project and will integrate them into the current Navy ERP (N-ERP) program. The program (N-ERP) was established in 2004 and is expected to be complete in 2011 at a cost of over 800 million dollars.

14. SUBJECT TERMS ERP, Enterprise Resource Planning, Navy, Revolution in Business Affairs			**15. NUMBER OF PAGES** 73
			16. PRICE CODE
17.SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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A CASE STUDY OF THE UNITED STATES NAVY'S ENTERPRISE RESOURCE PLANNING SYSTEM

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

NAVAL POSTGRADUATE SCHOOL
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This project was conducted as a case analysis of the Navy's ERP efforts, from the decision to adopt ERP up to the current Navy ERP program. The objective of the report was to develop a single-source document which provides the reader with enough information to have an understanding of the ERP efforts within the Navy. This study analyzes the history of ERP systems and the lessons learned from the commercial sector. The revolution in business affairs motivated the Navy to adopt ERP systems in 1997 and an initial program consisting of four pilots was initiated at major shore commands. Although the Navy viewed the pilots as a success, Congress criticized the pilots as a waste of one billion dollars. The Navy is continuing with the project and will integrate them into the current Navy ERP (N-ERP) program. The program (N-ERP) was established in 2004 and is expected to be complete in 2011 at a cost of over 800 million dollars.

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ACKNOWLEDGMENTS

We would like to thank our advisors, Glenn Cook and Dr. Doug Brinkley, for their help and guidance in completing this report.

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I. ERP HISTORY AND EVOLUTION

A. INTRODUCTION TO ENTERPRISE RESOURCE PLANNING SYSTEMS

An Enterprise Resource Planning System (ERP) is a software program that integrates the operations and functions of a business into a single computer system that serves all departments (Koch). Without ERP, the typical business will have stand-alone computer systems for finance, inventory management, personnel management, etc. Each system is tailored to the specific operations, tasks, and data collection requirements of the department it serves. While this configuration might suit the department's needs, it can be difficult, particularly in large corporations and government agencies, to integrate the data between departments. Combining the departmental data to provide corporate-level analysis and reporting is difficult and time consuming. Perhaps the greatest inefficiency in this type of configuration is the duplication of efforts, data storage, and unmatched databases. The purpose of the Enterprise Resource Planning system is to integrate all organizational functions into a single, integrated system with a single database (Koch). For example, an order originating in the sales module could generate an order to distribution, update the financial module, and provide updated statistics for the corporate planning module. An ERP system can perform these functions quickly, automatically, and with fewer errors than if performed manually ("Enterprise Resource Planning").

ERP software packages typically provide modules for customer-relationship management, sales and marketing, distribution, financials, and corporate planning ("ERP Software Guide"). Although the names might change for different vendors, most module functions fit in these categories. What sets the ERP system apart from its predecessors is the integration between the modules. In addition to the core function modules, many ERP providers and third-party vendors have developed add-on modules and integration extensions that cover nearly every business function.

B. THE EVOLUTION OF ERP SYSTEMS

The roots of ERP systems can be traced to the movement toward automation and computer-based inventory management programs in the 1960's. As computer use became more prominent and affordable, software programs were developed for inventory management control (Kampf). The focus of these early systems was to identify inventory requirements, set inventory targets, provide replenishment techniques and options, monitor item usage, reconcile inventory balances, and report inventory status to managers ("History of ERP Systems").

In the 1970's, the focus of software application development was Material Requirements Planning (MRP). MRP systems provided a means of translating the master production schedule into requirements for individual sub-assemblies and raw material planning and procurement (Kampf). Schedules could be generated for operations and raw material purchases based on the requirements for finished goods, the production system structure, current inventory, and lot sizing procedures ("History of ERP Systems").

Material Requirements Planning II (MRP-II) evolved in the 1980's as a system for optimizing the entire plant's operations. In its earlier incarnations, MRP-II added the capabilities of shop-floor management and distribution management activities. Later versions included the ability to manage finances, human resources, engineering, and project management. Enterprise Resource Planning systems were then developed as an integrated system that coordinated operations and data between modules to support production (Kampf).

C. ERP IN THE BUSINESS ENVIRONMENT

The focus of most modern ERP systems is to improve the order fulfillment process. Its purpose is to streamline the internal processes that turn an order into revenue with maximum efficiency. Modern ERP systems replace stand-alone departmental systems with an integrated software program. Most companies undertake an ERP to improve efficiency in three core areas: manufacturing, financials, and human resources (Kampf). The manufacturing modules standardize processes across business units and

departments, eliminating redundancy in processes, personnel, and computer systems. ERP financial modules provide a single version of financial data across business units and departments. The typical human resources module provides a single database for tracking employee pay, benefits, and services. Add-on modules have also been developed for supply-chain management, product lifecycle management, customer relationships, inventory management, and many other business and administrative functions ("Enterprise Resource Planning").

A successfully implemented ERP system can offer several advantages to a corporation. The following list summarizes the most common advantages of a successful ERP system:

- Inventory Reduction- this is largely due to a reduction in the amount of raw material and work-in-progress inventory. Additional benefits are gained from better-planned deliveries to customers and reduced inventory at warehouses and shipping docks.
- Improved and Integrated Customer Service- Instead of a customer order being handed off from department to department, it is instantly communicated throughout the company. Order information is instantly available to all departments that require it. For example, a shipping department would receive notification of an order as soon as it was taken, allowing them to plan for its arrival and departure long before they receive it (Koch).
- Standardized Manufacturing Process- multiple business units often use different systems and methods for manufacturing. ERP systems standardize a manufacturing method across department lines, increasing productivity and possibly reducing manpower. Redundant processes and computer systems are eliminated as well (Koch, Kampf).
- Integrated Financial Information- Every department's revenues and costs are held in a single database. A corporate-level picture of the financial well-being of the company is available much quicker than a system where department finances are kept separate. Invoice and order management tools can reduce the payment cycle (Koch).

Unfortunately, not all ERP implementations have been viewed as a success. Many companies have reverted to their old systems after finding their ERP system didn't fit their needs. Many other companies have pulled the plug on a conversion before it was ever completed. There are several reasons why ERP systems fail, but the following reasons dominate any discussion of ERP failures:

- ERP systems change your business processes. The conversion affects more than the computer and information systems. Companies must change their processes and work-methods to match the software. Despite this information being readily available, this is the most common reason that companies walk away from an ERP conversion. When a company discovers that one of their processes is not supported by the software, they have two options. The first option is to change their processes and practices in accordance with the software. In some cases, the business process in question is a vital competitive advantage of the company. Management will be hesitant to change a process or practice that is critical to the success of the corporation. Even when the decision is made to change the process, the conversion is seldom easy. Most people naturally resist change. Employees must be trained and new roles and processes defined. A working process must be discarded and a new process implemented. Companies resistant to change are more likely to fail than a company that embraces change (Koch). If the company decides to change the software to meet the business practice, the process becomes even more complicated. The changes will increase the cost of the system and slow down the project. Due to the integrated nature of an ERP system, changes have a ripple effect down to other modules in the system. Changes are seldom easy to implement. Each time the vendor updates the software, the company will have to pay to have the changes rewritten into the new release. This becomes increasingly difficult with each update ("Enterprise Resource Planning"). Inadequate requirements definition leads to a poor ERP package selection. The determination of whether the business process will meet the software functionality should be made before the company decides to implement an ERP system. A company considering an ERP

system must have adequately documented the business processes and functions involved in the conversion. The processes and functions must be matched to a system that can adequately replace them. Without adequate requirements definition, a company is left with an ERP system that doesn't provide the required functionality. The solutions to this problem are more money for additional changes or continuing to operate the system (in a stand-alone configuration) the company just paid to replace (Koch).

- Like most information technology projects, ERP conversions are prone to cost overruns. In 2003, the average cost overrun for an IT project was 43 percent ("Project Cost Management"). Companies must adequately address and plan for the expenses involved. Failures in the planning and requirements definition phase lead to unforeseen costs in the implementation phase ("Why ERP fails"). The aforementioned scenario where a company decides to change the software vice the process is an example of a cost that usually doesn't become apparent until the implementation phase. This customization makes the system unstable and harder to maintain once it is being implemented, which leads to higher costs. Eventually the increases in cost force some companies to abandon the project entirely (Koch).
- Time delays in the conversion process can be financially devastating. Unrealistic time-frame estimations lead to an underestimation of the loss of revenue while a company is undergoing the conversion ("Why ERP fails"). Delays caused by debugging, testing, and training led to lost orders, customers, and revenue for contractor GTSI in 2005. The company converted to an ERP system in 2005 in an effort to double revenue by 2007. Instead, the company blamed a disappointing second quarter of 2005 on the delays caused by the ERP conversion. The company says its ability to meet its long-term financial goals is also in jeopardy. In 1999, Hershey was unable to ship orders in the weeks before the lucrative Halloween season due to delays in their ERP project (Moore).

- Inadequate education and training cause delays in the conversion and return to normal business operations. The changes in roles and responsibilities after an ERP conversion are usually extensive. Personnel not adequately trained and prepared for a new role do not embrace the change ("Why ERP fails").

The costs of an ERP system vary depending on the package, but they are always substantial. The Meta Group conducted a study to determine the Total Cost of Ownership (TCO) of ERP. The study included hardware, software, professional services, and staff costs. TCO figures include the cost of installation and the first two years of operation. The sixty-three companies surveyed varied in size from small to large and covered a variety of industries. The average TCO was fifteen million dollars. The highest figure was $300 million and the lowest $400,000. A more accurate indicator of the cost of an ERP system is the cost per "heads-down" user. The Meta Group study produced an implementation cost of $53,320 per user ("Enterprise Resource Planning").

The total cost of an ERP implementation is not easy to determine. In addition to costs of the software and installation, there are several costs that are often overlooked:

- Training-Employees must be trained on the new software interface. The vendor can usually provide training on how to operate the interface, but not how that fits the way the company does business. Additional training might be required to explain the new business processes to be implemented (Koch).
- Integration and Testing-Once the system is installed, it must be tested to determine if it is successfully integrated with the rest of the corporate system. If the business operates its own e-commerce or supply-chain system, it must be successfully linked to the ERP system. Some ERP vendors will sell the add-ons and integration, or the company can do it themselves. Either way, it will require additional funding (Koch).
- Customization-The downfalls of customization have already been discussed in great detail. The costs of customization will continue each time the software is upgraded. Additionally, the vendor might not always be there to continue to modify the system. The costs to hire a third party to perform the modifications and maintain them will be significant (Koch).

- Data Conversion-Existing systems and data must be changed to fit the ERP system. All pertinent data must be moved from the old systems to the ERP. If the format isn't compatible, it will need to be changed, or the data cannot be used (Koch).

The length of time for an ERP project is dependent on the size of the company and the complexity of the system to be installed. It is important to consider items such as training, testing, and process re-engineering when estimating the time a conversion will take. In smaller companies or limited conversions, the timeframe could be as short as six months. For most large companies, the timeframe for a conversion is measured in years (Koch).

The methods for implementation are also dependent on the type of package and business involved. The approaches can be summarized into three broad categories (Kampf):

- Big Bang-The company completely abandons its legacy systems and implements an ERP system across the entire company. This approach is the most ambitious and difficult of the three approaches.
- Franchising-In this approach, an ERP system is installed in an independent division or business unit. The system links common processes and data across the corporation. This approach is more common among large companies with several business units.
- Slam-Dunk-The ERP system dictates the process designs. The company conforms to the ERP systems processes. The goal is to get the system online as soon as possible. This approach is for smaller companies who can grow into the ERP.

D. ERP KEYS TO SUCCESS

The early days of ERP implementation had its share of failures. As the technology matured, several widely-accepted keys to successful implementation have been developed as the number of implementations (successful and unsuccessful) increased.

A business process review should be undertaken to match processes and software. This will ensure the company has selected a software package that will support its operations. This will also identify the areas where the company must make changes in their processes to match the ERP system.

Education and training is critical. Training should focus on change management strategies and what the new business process will look like. Employees should understand what new system is designed to accomplish. The department managers and end-users must be trained in how to use the system.

Software modifications must be limited to critical functions that are vital to the company. Changes should be made to the process vice the software if possible. Modifications to the software will increase the cost, timeframe, and complexity of the conversion. The cost increases will be recurring since the changes will need to be re-installed with each update of the software ("Why ERP fails").

A change management team can be the difference between success and failure. When a company commits to an ERP project, they are committing to more than just a software change. They are changing the business. Change management teams train employees, evaluate and implement new processes, and provide support to the users of the new system. The team should focus on real changes to the business vice monetary savings ("ERP Implementations and ROI…").

II. THE MOTIVATION TO ADOPT ERP

A. DOD FINANCIAL MANAGEMENT REFORMS

The past three decades have produced a renewed focus on the government's financial management practices. The Department of Defense in particular has been pushed toward adopting best practices and standards from corporate America. A series of Congressional Acts and initiatives starting in the 1980's provided the impetus for sweeping changes to government financial management.

- Federal Managers Financial Integrity Act (1982)-This act requires executive agencies to evaluate and report the adequacy of its internal accounting systems and administrative controls, as well as any weakness that could lead to waste, fraud, and abuse. The prevalence of wasteful spending, ineffective programs, and billions of dollars in lost funds in the early 1980's resulted in the establishment of the President's Improvement Program. Thousands of antiquated, redundant systems in the government were unable to produce basic government-wide management reports to the President. The weaknesses in the information systems made fraud easier to commit and the archaic, inaccurate accounting systems made it difficult to catch. The Federal Managers Financial Integrity Act was part of the President's attempts to modernize federal financial management (Jones 340-341).
- Chief Financial Officer's Act (1990)-The CFO act created the position of CFO for the United States in the Office of Management and Budget and twenty-two other CFO's in major agencies. The position was intended to provide oversight and direction for federal financial management and information systems, including productivity measures, asset management, cash management, and internal controls. Among the many requirements for the newly established Chief Financial Officers would be providing annual financial statements using generally accepted accounting terms. These statements would audited annually and certified by the Inspector General. Other provisions included a reduction in the number of separate department accounting systems and continuing the

modernization of financial systems. Much of the framework for financial management reform had been created prior to the CFO act, but the passage of this statute provided continuity to the reform efforts (Jones 350).

- Government Performance and Results Act (1993)-Directs federal agencies to prepare strategic plans based on performance. Congress requires annual reports comparing actual performance to goals. This act provided Congress a link between program spending and expected program results ("Overview of GPRA").
- Government Management Reform Act (1994)-The GMRA expanded the Chief Financial Officer Act, requiring the 24 agencies that account for 99 percent of federal spending to prepare annual audited financial statements. The statements should present a picture of the financial position of each entity, including assets and liabilities and the results of operations ("Legislation and Reform Initiatives").
- Corporate Information Management (CIM) Program-This program was established in 1989 with the goal of streamlining operations and implementing standard information systems to support common business operations. CIM was expected to consolidate, standardize, and integrate information systems in all of DOD's functional areas-finance, procurement, material management, and human resources. This program was criticized by Congress as lacking sound analytical justification in its investments and decision-making. The program was abandoned after eight years and twenty billion dollars with little to show for the effort (Kutz 4).

B. DEPARTMENT OF DEFENSE PROGRESS IN COMPLYING WITH FINANCIAL MANAGEMENT REFORM ISSUES

The Department of Defense has had great difficulty complying with many of the reform issues. DOD has not received one clean audit of the required financial statements. Despite significant effort and billions of dollars in funding, many of the conditions that led to the attempts at reform remain largely unchanged today (Kutz 3).

Congress identified four underlying causes for the department's difficulties in implementing reform:

- A lack of top-level leadership and management accountability for correcting problems.
- A deep cultural resistance to change, including parochialism and stovepiped operations.
- The department lack results-oriented goals and performance measures.
- There are inadequate incentives for change.

Additionally, the department has not historically assigned accountability for performance to organizations or individuals who have sufficient authority to accomplish the desired goals. For example, the DOD comptroller has responsibility for only 20 percent of the data relied on the carry out the department's financial management operations (Kutz 10).

The department's financial management problems go beyond its accounting and finance systems and processes. There are critical hardware and software deficiencies that contribute to the problem. The department relies on a complex, non-integrated network of finance, logistics, personnel, acquisition, and management information systems to gather the financial data to support management decision-making. Much of this network (80 percent) is not under the control of the DOD comptroller. The network was not designed, it grew piecemeal and independently into the complex system that exists today. Its biggest flaws include (1) lack of standardization across DOD components, (2) multiple systems performing the same tasks, (3) redundant data stored in multiple systems, (4) manual data entry into multiple systems, and (5) many data translations and interfaces that combine to intensify data integrity problems (Kutz 6).

The challenges of financial management reforms have the attention of Congress and the Secretary of Defense. The department remains focused on developing and implementing an architecture to achieve integrated financial and accounting systems that are relevant, timely, and reliable. Secretary of Defense Donald Rumsfeld stated in his 2001 Quadrennial Defense Review that the department must transform its outdated support structure and decades-old financial systems. He summarized the challenges in

stating: “While America’s businesses have streamline and adopted new business models to react to fast-moving changes in markets and technologies, the Defense Department has lagged behind without an overarching strategy to improve its business practices (Kutz 15-16).”

C. THE REVOLUTION IN BUSINESS AFFAIRS (RBA) AND NAVY ERP

The revolution in business affairs (RBA) program was developed in 1997 as a result of the Secretary of the Navy’s desire to implement Joint Vision 2010 and to strategically transform business affairs within the Navy. Joint Vision 2010, sponsored by the Joint Chiefs of Staff, created a vision for revolutionizing and modernizing the business processes in the military. The Navy and DOD were still struggling to conform to the management reform initiatives of the previous two decades. Congressional criticism of the services efforts at implementing reform often focused on a lack of leadership and management from the highest levels of the services. The RBA program was the Navy’s attempt to put in place the infrastructure to transform the Navy’s business and financial operations.

An RBA Board of Directors was developed consisting of the Under Secretary of the Navy, the Vice Chief of Naval Operations and the Assistant Commandant of the Marine Corps. They directed an Executive Committee (RBAEXCOM) be established, whose mission was to identify ways of transforming the Navy’s business operations and identify areas with opportunity for change (Berg). The executive committee developed various working groups aimed towards transformation. The Commercial Financial Practices (CFP) Working Group was directed to lead the way in developing better business practices for financial management decisions within the Navy.

The CFP was led by VADM Lockard, Commander, Naval Air Systems Command (COMNAVAIR), and was composed of various financial managers throughout the Navy. Their assigned mission included (Berg):

- Consolidate and prioritize current financial management initiatives and progress to serve as the foundation for future reform.

- Accelerate the Department-wide introduction and use of appropriate commercial financial practices and reporting.
- Develop a strategic plan for implanting a business management process that will enable DON decision-makers to assess cost and performance.
- Establish a plan and architecture to implement reforms.

Their ultimate conclusion was to have six pilot programs implement ERP with differing functionalities. The selection was made because old legacy systems still in use today are expensive to maintain, and the group hoped that ERP systems would cut costs and eventually save the Navy money while improving the business infrastructure overall.

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III. THE NAVY ERP PILOTS

A. INTRODUCTION

The Commercial Financial Practices Working Group was renamed the Commercial Business Practices Working Group (CBP) , and it was this group, still led by VADM Lockard, that ultimately decided the Navy should venture into Enterprise Resource Planning (ERP).

Following several meetings and several presentations by various vendors including Oracle, Price Waterhouse Coopers and organizations within the Navy, a decision to go forward was made. "Industry executives told Navy leaders that their success in re-engineering business processes came from their ERP systems, which helped them integrate and coordinate all aspects of their operations (McCarter)." The working group identified as its vision: "DON will use best business practices and supporting architecture to make informed decisions resulting in optimal outcomes (Berg 13)." They also came up with the following goals (Berg 13):

- Achieve integrity in the DON financial condition – maintain public trust.
- Get the right business information to the right people at the right time – one set of books.
- Know cost drivers and relate costs to value.
- Make financial info an automatic by-product of process/decision.
- Develop decision support capabilities for all levels.
- Identify and install required architecture (Develop architecture to support end to end capability).

Ultimately, these goals were the driving forces leading them to ERP. To get the ERP program moving, six pilot programs with differing functionalities were identified (Berg 13):

- Naval Air Systems (NAVAIR) - Program Management/Acquisition.
- Naval Supply Systems Command (NAVSUP) partnered with (NAVAIR) - Aviation Supply Chain Management and Maintenance.

- Space and Naval Warfare Systems Command (SPAWAR) - Financial Management.
- Naval Sea Systems Command (NAVSEA) – Regional Maintenance.
- Commander in Chief Pacific Fleet (CINCPACFLT) – Facilities Management.
- U.S. Marine Corps (USMC) – Logistics.

The first four programs listed above passed initial decision points and survived any budget constraints enough to continue. "Navy officials originally identified six pilots but could fund only four this year, said Ronald Turner, the service's deputy chief information officer for infrastructure, systems and technology (Murray)." CINCPACFLT and USMC will be integrated into the Navy ERP as the program develops. Figure 3-1 shows the scope of the individual four pilots, the pilot name, area of focus and stand-up date.

Pilot	Sponsor	Area(s) of Focus	# of Geographic Sites	# of Users	Stand-Up Date
SIGMA	NAVAIR	Program Management, including linkage among Contracting, Financial, and Workforce Management	5	6200	Oct 02
			4	14300	Jan 03
CABRILLO	SPAWAR	Warfare Center Management	5	3500	Jul 01
SMART	NAVSUP	National & Local Supply Management, Intermediate-Level Maintenance Management Interface to Aviation Depots	4	440	Jan 03
NEMAIS	NAVSEA / FFC	Regional Maintenance, including Intermediate-Level Maintenance Management, Project Systems, and Workforce Management	3	5400	Jun 02 – Nov 03
			2	4500	FY 04/05

Figure 3-1. NAVY ERP PILOT PROGRAMS (Bogdanowicz)

B. INTRODUCTION TO THE FOUR PILOT PROGRAMS

The four pilot programs were each given the go ahead in 1999, and interestingly, the four Program Managers (PM's) were given the authority to choose different integrating contractors and ERP software. The Executive Steering Group thought the best way to figure out which ERP software was superior was to let each pilot select one on their own and see which one had a better solution once the programs got initiated (McCarter). Fortunately, considering the integration challenges ahead, all four programs selected SAP software. "SAP is a market and technology leader in client/server enterprise application software, providing comprehensive solutions for companies of all sizes and all industry ("SAP Global")." Figure 3-2 is the SAP database configured for the NEMAIS pilot as of January 2005. Each pilot started with the basic database as shown and developed from there. The four did, however, select different integrating contractors to implement the software.

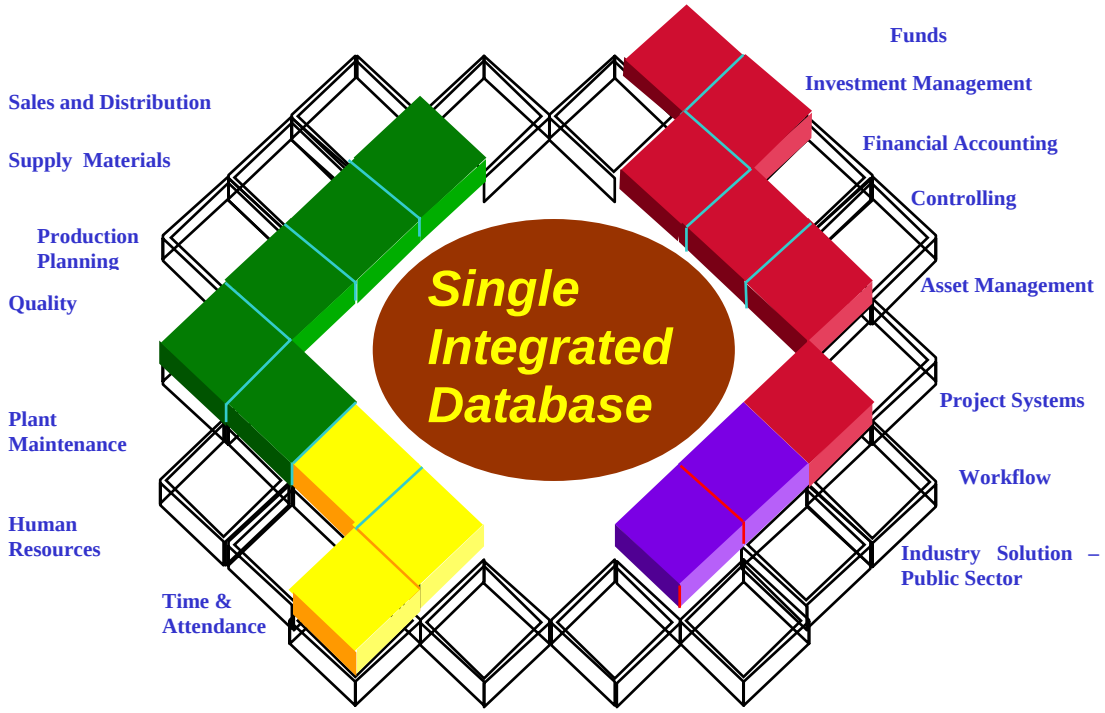

Figure 3-2. SAP NEMAIS (Hutsenpillar 10)

1. Naval Air Systems Command (NAVAIR): SIGMA

NAVAIR is the lead agency for the Program Management ERP pilot SIGMA. They are also the co-lead on project SMART. The command has 10 locations around the world including one in Atsugi, Japan, one in Naples, Italy and 8 others within the United States. Their current vision statement says, "We exist to provide cost-wise readiness and dominant maritime combat power to make a great Navy/Marine Corps team better." Their goals are as follows ("About NAVAIR"):

- To balance current and future readiness**.** We need to ensure that we provide our Naval Aviators with the right products to fight the Global War On Terrorism and other potential future conflicts.
- To reduce our costs of doing business. We need to pursue actual cost reductions, not so-called 'savings' or 'avoidance.' We need to return resources to recapitalize our Fleet for tomorrow. We must continue to introduce best business practices and remove barriers to getting our job done with greater efficiencies.
- To improve agility**.** Our ability to make rapid decisions in support of emerging Fleet requirements is essential if we are to continue to provide value to the nation. We must reinvigorate a solid chain of command that values responsibility and accountability in its leadership.
- To ensure alignment. We have come a long way aligning ourselves internally, now it is time to ensure that we are fully aligned, internally and externally, with CNO's transformation initiatives.
- To implement Fleet-driven metrics. Single Fleet-driven metrics will ensure we directly contribute to the Naval Aviation Enterprise.
- SIGMA officially began in February 2000 with a five year contract awarded to KPMG, a business consulting firm and the leading integrator for the project, with subcontractors IBM and SAIC assisting with implementation and installation of proven Commercial-Off-The-Shelf (COTS) SAP ERP software with minimal changes (Dyer 2). In a brief given in 2001, VADM Dyer, Commander of the Naval Air Systems Command ("About NAVAIR"), stated that SIGMA's intention was to demonstrate program management capability

using data and processes from the E-2C Hawkeye program office, and SIGMA's primary impact on NAVAIR was expected to impact NAVAIR Headquarters, North Island, Patuxent River and Orlando locations (Dyer 2). The main focus areas of the project include:

- Financial Management.
- Weapon System Acquisition.
- Asset Tracking / Configuration Management.
- Human Resources.

2. Space and Naval Warfare Systems Command (SPAWAR): CABRILLO

SPAWAR is the lead agency for the Navy Working Capital Fund (NWFC) project CABRILLO. The command has four major fleet activities, and CABRILLO is specific to the NWCF in San Diego. SPAWAR's current vision statement reads "FORCEnet is the decisive weapon for the future Force," and their mission statement reads "Team SPAWAR "delivers" FORCEnet – transforming information into decisive effects." On the company website, SPAWAR provides six major items which cover the spectrum of services they provide as follows ("Space and Naval…"):

- Partner with PEO C4I and Space, PEO Space Systems and PEO Enterprise Information Systems to deliver C4ISR and FORCEnet capability to the joint warfighter.
- Develop Navy, joint and coalition interoperability.
- Serve as Navy C4ISR Chief Engineer.
- Serve as Navy FORCEnet Chief Architect/Assessor.
- Maintain combined TOA of $5.4 Billion.
- SPAWAR is one of the Navy's five major acquisition commands and has 7,600 employees.

CABRILLO began in June 2000, following a business case analysis completed in 1999, and was to focus on improving the business operations, process and support systems in San Diego (Dyer 3). The primary integrating contractor selected was

PriceWaterhouseCoopers, and the selected software was from SAP. The focus areas to be included in the pilot were (Frye 2):

- Financial Management.
- Procurement Management.
- Asset Management.
- Human Resource Management.
- Project Management.
- Strategic Planning.

NAVSUP and NAVAIR were partnered up for the Supply Chain Management pilot SMART. NAVSUP has 9 major Fleet Industrial Supply Centers (FISC) around the world with the primary headquarters in Mechanicsburg, Pennsylvania. Their primary mission statement is ("Our Team"):

> NAVSUP's primary mission is to provide U.S. Naval forces with quality supplies and services. With headquarters in Mechanicsburg, Pa., and employing a worldwide workforce of more than 24,000 military and civilian personnel, NAVSUP oversees logistics programs in the areas of supply operations, conventional ordnance, contracting, resale, fuel, transportation, and security assistance. In addition, NAVSUP is responsible for quality of life issues for our Naval forces, including food service, postal services, Navy Exchanges, and movement of household goods.

SMART began in August 2000 and encompasses several users and organizations, but primarily it was selected to replace financial and maintenance legacy systems (Ahern):

- Uniform Inventory Control Point (UICP) U2. A legacy system used to provide automated means of processing transactions daily within the Navy supply system.
- Naval Aviation Logistics Command Management Information System (NALCOMIS) in Norfolk and San Diego for the E-2C aircraft and LM-2500 engine programs. Specifically it included organizational, intermediate and depot level maintenance.

- The Naval Inventory Control Point (NAVICP) in Mechanicsburg, PA and Philadelphia, PA. This is the group that manages the two systems in Norfolk and San Diego.

SMART selected SAP for their software provider, and Electronic Data Systems Corporation (EDS) was chosen as the primary software integrator. Considering the risks and hoping to maximize the benefits of the program, a four-phase approach to implementation was developed (Dyer 3):

- Phase 0: A business case analysis was conducted and source selection was decided upon.
- Phase 1: Employ the ERP integrator to map out the current systems, select the software solution, figure out the gaps and recommend the ERP solution.
- Phase 2: Along with the integrator and selected software, implement the ERP solution for the E-2C and LM-2500.
- Phase 3: Forward pilot results to the ESG with a revised business case analysis including other commercial pilots and anticipate the expansion of ERP solutions to all naval weapons systems and equipment.

3. Naval Sea Systems Command (NAVSEA): Navy Enterprise Maintenance Automated Information System

NAVSEA is the lead agent for the NEMAIS intermediate and depot level maintenance ERP pilot. NAVSEA encompasses all naval shipyards, shipbuilding sites, shore intermediate maintenance activities, Trident refit facilities, all Navy ships and submarines (Dyer 2). Their primary mission, "in partnership with private-sector shipbuilding and ship repair contractors, build, maintain, and modernize affordable ships that are operationally superior so our Sailors and Marines can protect and defend our national interests and, if necessary, fight and win (Sacha)."

NEMAIS began in June 2000 with IBM contracted as the lead integrator. SAP was chosen to be the software provider. For implementation purposes, the project was divided into the following phases (Dyer 2):

- Mid Atlantic Regional Maintenance.
- Norfolk Naval Shipyard.
- Legacy data conversion, concurrent with Phase B.

- Remaining maintenance regions (7).
- Supervisor of shipbuilding sites.
- Mobile Enterprise resource Planning – 300 Navy ships.

C. THE EXECUTIVE STEERING GROUP AND THE NEED FOR INTEGRATION

An Executive Steering Group (ESG) was organized in December 1998 to oversee the pilot programs. Its charter included holding monthly meetings to ensure any issues were resolved or addressed and to provide informational briefings regarding general ERP in DOD and the DON (Berg 17). Pilot Program representatives reported progress at each meeting and any issues were addressed as appropriate. VADM Lockard chaired this group. Other members included System Commands, Fleets, OPNAV N8 and other interested parties.

1. The Horizontal Integration Team

The need for integration across all the pilots was evident from the beginning, so the ESG directed that a Horizontal Integration Team (HIT) be organized in June 1999. The HIT was composed of an executive committee member and representatives from each of the four pilot programs. This group was to meet as often as required. The HIT was supposed to help focus the ERP efforts across the pilots and take advantage of lessons learned as each program developed. In August 2000, the HIT was removed for various reasons including a lack of resources and the lack of authority for leading the integration efforts among the pilots (Berg 35). The individual Program Managers (PM's) requested and were given direct responsibility for taking over the HIT responsibilities by getting approval from the ESG for creating the Integration and Coordination Board (ICB) in September 2000.

2. The Integration and Coordination Board

The ICB was a direct result of the program managers desires to have full responsibility for their programs including integration issues. In his 2001 summary ERP brief, VADM Dyer briefed that the ICB was composed of the four Program managers, DFAS and DLA. Meetings were to be conducted on an as needed basis, and the board was to act as "the frontline decision authority on integration and coordination matters,"

and decisions that were too complex for agreement or involved Navy-wide strategic decisions were briefed to the ESG. The VADM pointed out the following advantages to having an ICB (Dyer 1):

- The ICB would give improved cross-pilot coordination on scope, configuration, and deployment issues.
- Program Management Authority was part of the board, so directing resources towards enterprise-wide solutions would be easier.
- The ICB meetings would provide a forum for consolidation of issues that could provide a rapid response capability.

The working relationship of the ICB will provide a formal mechanism around the ESG's goal of integration and cross-pilot issue resolution (Dyer 1). The ICB had a supporting staff and sub-teams. The final ERP integration chain of command, as of September 2001, is depicted in Figure 3-3.

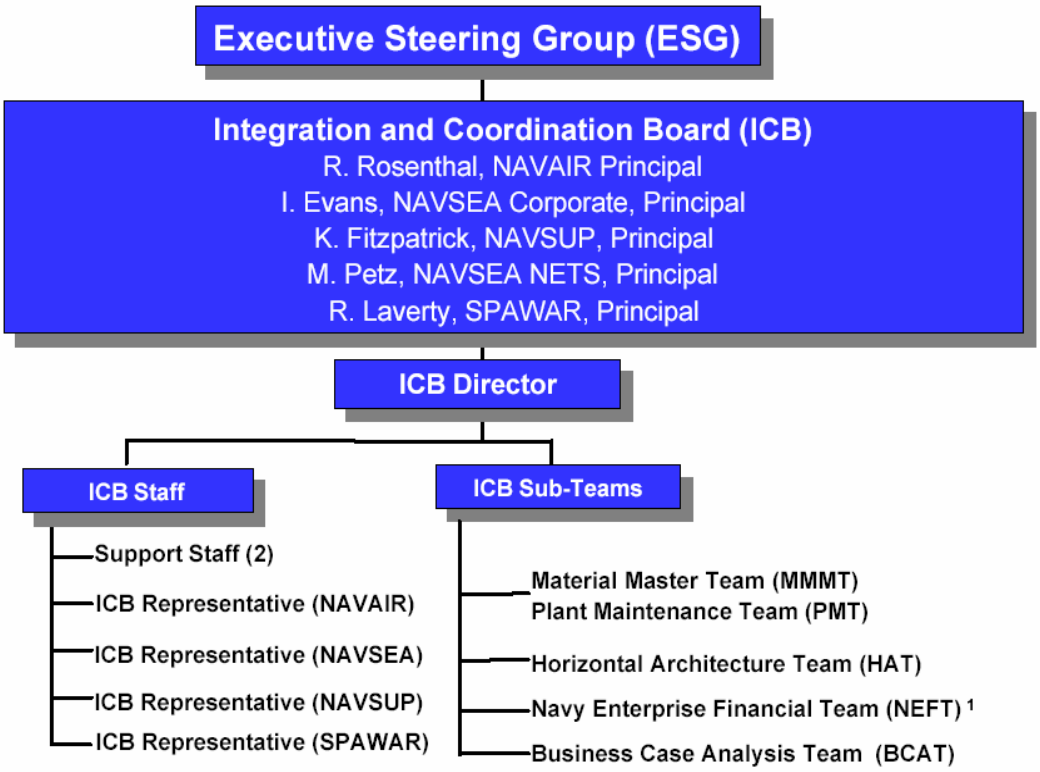

Figure 3-3. ERP INTEGRATION CHAIN OF COMMAND (Navy ERP Project Overview)

D. THE GAO REPORTS

"The Government Accounting Office (GAO) is the investigative arm of Congress charged with examining matters relating to the receipt and payment of public funds (Government Accountability Office)." Under this purview the government office tracks all of the spending within the nation which includes the Department of Defense (DOD) and the Department of the Navy (DON) along with its ERP pilot programs. Congress requests reports and investigations as appropriate and the GAO investigates.

In April 2005 the GAO published GAO-05-381 titled, "DOD Business Systems Modernization, Billions Being Invested Without Oversight." It is not specific to the Navy ERP pilots, but does mention them briefly enough to warrant discussion in this paper because it was not favorable to DOD overall and used the ERP pilots in its justification for its conclusions. In September 2005, the GAO published GAO-05-858 titled, "DOD Business Systems Modernization, Navy ERP Adherence to Best Business Practices Critical to Avoid Past Failures."

1. The GAO High Risk Series

To understand why the GAO was tracking the Navy ERP pilot programs specifically, considering the thousands of other programs they are responsible for, it is important to be familiar with the GAO's High Risk Series.

> GAO's audits and evaluations identify federal programs and operations that, in some cases, are high risk due to their greater vulnerabilities to fraud, waste, abuse, and mismanagement. Increasingly, GAO also is identifying high-risk areas to focus on the need for broad-based transformations to address major economy, efficiency, or effectiveness challenges ("High Risk…GAO-05-207").

Programs that make the list are tracked closely and Congress gets routine or as-requested reports. Since 1990, the GAO has been keeping the high risk list, and DOD's business systems modernization program has made the list every year since 1995.

2. DOD Business Systems Modernization, Billions Being Invested Without Adequate Oversight (GAO-05-381)-April 2005

The GAO conducts investigations to ensure major programs are progressing properly, and this report is focused primarily on the DOD business modernization program. It is not very favorable overall, and it does include the Navy ERP pilot

programs. A sampling of the reports findings is presented below so that an appreciation for the GAO opinion presented can be realized ("DOD…GAO-05-381" 3):

> DOD has made limited progress in putting in place the management structure and controls that will help eliminate its continued spending of billions of dollars on systems that do not address corporate solutions to long-standing financial and business-related problems. Over the past several years, we have made numerous recommendations aimed at improving the department's control and accountability over its business systems investments. DOD has made some efforts to address our recommendations, but has yet implemented key corrective actions to fully address them. For fiscal year 2005, DOD requested over $13 billion dollars to operate, maintain and modernize its existing business systems environment. On its face, this is about $6 billion dollars less than the $19 billion requested in fiscal year 2004. But we found the difference reflects more a reclassification of systems than a reduction in spending on business systems. Also, the number of business systems reported by DOD continued to increase-from 2,274 systems in April 2003 to 4,150 systems in February 2005.

The Navy ERP program is specifically mentioned with regards to the problem of reclassifying budget lines. Reclassifying makes it much harder to track money from year to year and over the lifecycle of a system. The problem of keeping track of Information Technology (IT) expenditures is already difficult for the DOD. This is suggested because money is routinely used from various sources for IT expenses throughout the DOD and never recorded as an IT expense. The GAO report found 56 DOD systems that had been reclassified and some of them seemingly by accident. For example, the four ERP pilots have always been classified in earlier budgets as business systems. The 2005 budget request for the Navy ERP IT program, new in 2005, was listed as a national security system, and Navy ERP program officials agreed it was incorrectly classified and will be corrected in 2006. "DOD officials were not able to provide a valid explanation why the program was classified as a national security program ("DOD…GAO-05-381" 4).

3. DOD Business Systems Modernization, Navy ERP Adherence To Best Business Practices Critical To Avoid Past Failures (GAO-05-858)-September 2005

This report was not very favorable towards DOD business practices either, but it was specifically written regarding the Navy ERP Pilots. In short, it states that the four pilot programs were failures, and that the Navy needs to adhere to best business practices

if the new Navy ERP program is going to be successful. Suggestions and recommendations for future success are provided as well as potential problem areas the authors discovered during their investigation. The report is a culmination of the author's efforts from August 2004 to June 2005 and includes comments from the DOD in a appendix. The conclusion of the report begins with, "The lack of management control and oversight and a poorly conceived concept resulted in the Navy largely wasting about $1 billion on four ERP system projects that had only limited positive impact on the Navy's ability to produce reliable, useful, and timely information to aid in its day-to-day operations ("DOD…GAO-05-858" 47).

a. Problems Identified in the Report

Several problem areas are presented in the GAO report. The authors give recognition to the fact that the four pilots were to be limited in scope and not designed to become the corporate solution for the Navy's business issues. The following problems were identified:

- The pilots lacked coordinated management oversight. Each command managed and funded their project without a central coordinator, which led to each program being developed independently. The result is the Navy having four more stovepiped systems.
- The pilots do not work together. Each pilot started with the same Commercial Off the Shelf (COTS) software, but because they developed independently of each other, the pilots won't work together even though they do some of the same functions.
- There is redundancy of operations and duplication of efforts. The lack of coordination amongst the pilots has led to different solutions for similar requirements ("DOD...GAO-05-858" 12).
- Configuration problems have turned out a system that cannot process transactions associated with normal Navy practices in regards to moving ships and aircraft between fleets. User roles and transactions have been assigned incorrectly so that some users cannot due their jobs correctly ("DOD...GAO-05-858" 16).

- The pilots have had problems with controlling scope and performance schedules. They have problems identifying the amount of work necessary to achieve originally specified capabilities. Repeated contract cost-growth and delays in delivery of some planned capabilities have occurred since the systems began operating.
- The pilots lacked Department of Defense oversight. The Navy should have designated the pilots as major automated information systems acquisition programs, but used the term "pilot" to avoid reporting them as such. When the pilots started, any system costing more than $32 million in a year was supposed to be a major program which required additional reporting criteria. Without major program oversight, the Navy was able to keep all oversight at the organizational level. The pilots were able to spend without having to undergo mandatory integrated reviews which are used to determine where to spend limited resources department wide.
- The Navy has to start over, or rework, its ERP efforts after investing $1 billion. "Rework occurs when the original work has defects or is no longer needed because of changes on project direction. Studies have shown that fixing a defect during testing is anywhere from 10 to 100 times more expensive than fixing it during the design or requirements phase."
- The pilots modified the COTS software to fit their requirements. COTS is designed using best business practices and should only be modified under extreme circumstances. The pilots should have modified their business practices to match the COTS software rather than vice versa ("DOD…GAO-05-858" 17-25*).*

b. GAO Opinion of the Current Navy ERP Program

In Aug 2002, the Assistant Secretary of the Navy established a Navy-wide ERP program and directed that the four pilots be converged into a single program. All four pilots are planned to be replaced by 2008. The GAO report reviewed the current Navy ERP program and had the following comments ("DOD…GAO-05-858" 12):

- The Navy is following a comprehensive and disciplined management process and is using the lessons learned from the pilots.
- Navy ERP is adhering to the fundamental concept of COTS and understands that modifying their business practices to match COTS software is the efficient and advantageous way to proceed.
- Users are getting involved early and getting extensive training. Leadership is emphasizing the need for process change, and the results are that the entire chain of command is supportive and knowledgeable.
- The Program Office is keeping track of the integrators and ensuring they implement the methodology and use the common tools supplied by the COTS vendor.

c. GAO Recommendations

Three recommendations to the Secretary of Defense (SECDEF) were made in the report ("DOD…GAO-05-858" 48):

- The SECDEF should require the Secretary of the Navy (SECNAV) to require the ERP Program Management Office to develop and implement the quantitative metrics needed to evaluate project performance and risks and use the quantitative metrics to assess progress and compliance with disciplined processes.
- The SECDEF should require the SECNAV to require the ERP Program Management Office to establish an independent verification and validation (IV&V) function and direct that all IV&V reports be provided to Navy management and to the appropriate DOD investment review board, as well as project management.
- The SECDEF should direct the Defense Business Systems Management Committee (DBSMC) to institute semiannual reviews of the Navy ERP to ensure that the project continues to follow the disciplined processes and meets its intended costs, schedule, and performance goals.

d. Department of Defense Response to GAO-05-858

The Deputy Under Secretary of Defense (DUSD) for financial management and the DUSD for business transformation responded in September 2005 to the GAO recommendations as follows ("DOD…GAO-05-858" 58):

- They concurred with the recommendation to implement metrics. "The Navy ERP Direct Reporting program Manager is activating quantitative metrics related to configuration control, development progress, earned value and quality."
- They partially concurred with the recommendation to have an IV&V function and have reports distributed. It was agreed an IV&V function should be established, but the IV&V reports will be limited to Navy ERP PM and the Navy Component Acquisition Executive.
- They partially concurred with the recommendation for having semi-annual reviews. The reply stated that the DBSMC already gets transformational briefings from each of the components that contain overall efforts, initiatives and business systems.

E. THE COST OF THE PILOTS

The costs for the programs are fairly difficult to trace because the only cost data available is the data reported by the ERP Program Managers. Through 2004, the Navy funded the programs via the designated pilot commands without requiring separate budget line item justifications. The 2005 Navy budget request was the first year the Navy had an all inclusive ERP request. The individual Program Managers for each of the pilots reported the following total costs of their pilot through September 2004 as follows:

- CABRILLO $67.4 million
- SMART $346.4 million
- NEMAIS $414.6 million
- SIGMA $215.9 million

Total: $1,044,300,000

The 2005 budget request for the Navy was $3.5 billion for business systems operations and upgrades, and it does include ERP. The Navy estimates the ERP will not be fully operational until 2011 at an estimated cost of $800 million ("DOD…GAO-05-858" 13-40).

F. LESSONS LEARNED FROM THE PILOTS

All four of the pilots were designed with different areas of focus. There was overlap in some specific application areas, but not in any major functional area. All of the pilots went live over three years ago: Cabrillo went live in July 2001, NEMAIS in June 2002, SIGMA in October 2002 and SMART in January 2003. The current Navy ERP program, which includes the ongoing pilots, is supposed to use the lessons learned from those pilots to date. Although each pilot reported and continues to provide lessons learned, the list provided is comprised of lessons that were common to all four programs:

- Programs must follow disciplined processes to identify and manage requirements.
- Working level reviews must be cross functional. Stovepipe systems will not work, so every element of ERP must be designed to work with the others.
- Adopt business processes to conform to the types of business practices on which the standard COTS packages are based. Keep customization to a minimum.
- Organizational commitment is essential.
- Planning and task monitoring is critical for all project phases.
- Make key design decisions early.
- Communication is vital.
- Manage integration and move beyond organization boundaries.
- Carefully plan how the system and process change will be managed after "go live".
- Lead through the change. People will want to use the old system. Encourage and train them properly for the new system ("2005 ASUG…").

- Institutionalize business rules and processes. Update rules, instructions and training materials regularly (“2005 ASUG…”) (“DOD…GAO-05-858” 23-24)(“Our Team”).

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IV. NAVY ERP INTO THE FUTURE

A. INTRODUCTION

The Navy reported the pilot programs as successful, so the decision was made to continue with the ERP efforts and converge the pilots into a single major program starting in 2004. The acquisition process began in 2003 and by late 2004, Milestones A and B were achieved. The program will be very expensive and trying to determine what the actual costs will be is impossible at this point in time.

Navy ERP is only a small part of the much larger DOD RBA and is only a small part of the Navy transformation efforts as well. This chapter begins by introducing the DOD and Navy influences affecting the ERP program because having knowledge of them should help one understand how the Navy ERP effort is part of a much larger project and not just a simple software implementation. The rest of the chapter discusses the ERP program from the success of the pilot programs to the potential costs.

B. NAVY ERP IS PART OF THE DOD TRANSFORMATION

To really understand why implementing a COTS software program can be so difficult for the Navy, one has to understand where the requirements for the change are coming from. As previously discussed, the DOD is going through a Revolution in Business Affairs (RBA), and following the establishment of the BMMP in 2001 by the SECDEF, the Navy and all the services have been impacted by it. The establishment of a Business Enterprise Architecture (BEA) with requirements specific to Navy ERP is also impacting the program significantly as it develops. To be considered successful beyond the pilots, Navy ERP will have to be compliant with regulations and the DOD enterprise architecture. The following paragraphs present the major initiatives and oversight agencies within DOD for the business transformation efforts.

1. Business Management Modernization Program (BMMP)

In September 2001, the SECDEF commissioned the BMMP program as a way to transform the DOD. “He called for dramatic changes in management, technology, and business practices. The Secretary stated that transformation was a matter of utmost

urgency because ultimately the security of the nation was at stake ("DOD ETP" V)." BMMP is the guiding program which outlines the standards and establishes authority and accountability within the DOD and its RBA. Figure 4-1 shows the BMMP Transformation Approach as depicted in the Enterprise Transition Plan for DOD. The Navy pilot ERP programs began prior to the BMMP program, but have since been incorporated under the guidelines and leadership of the program.

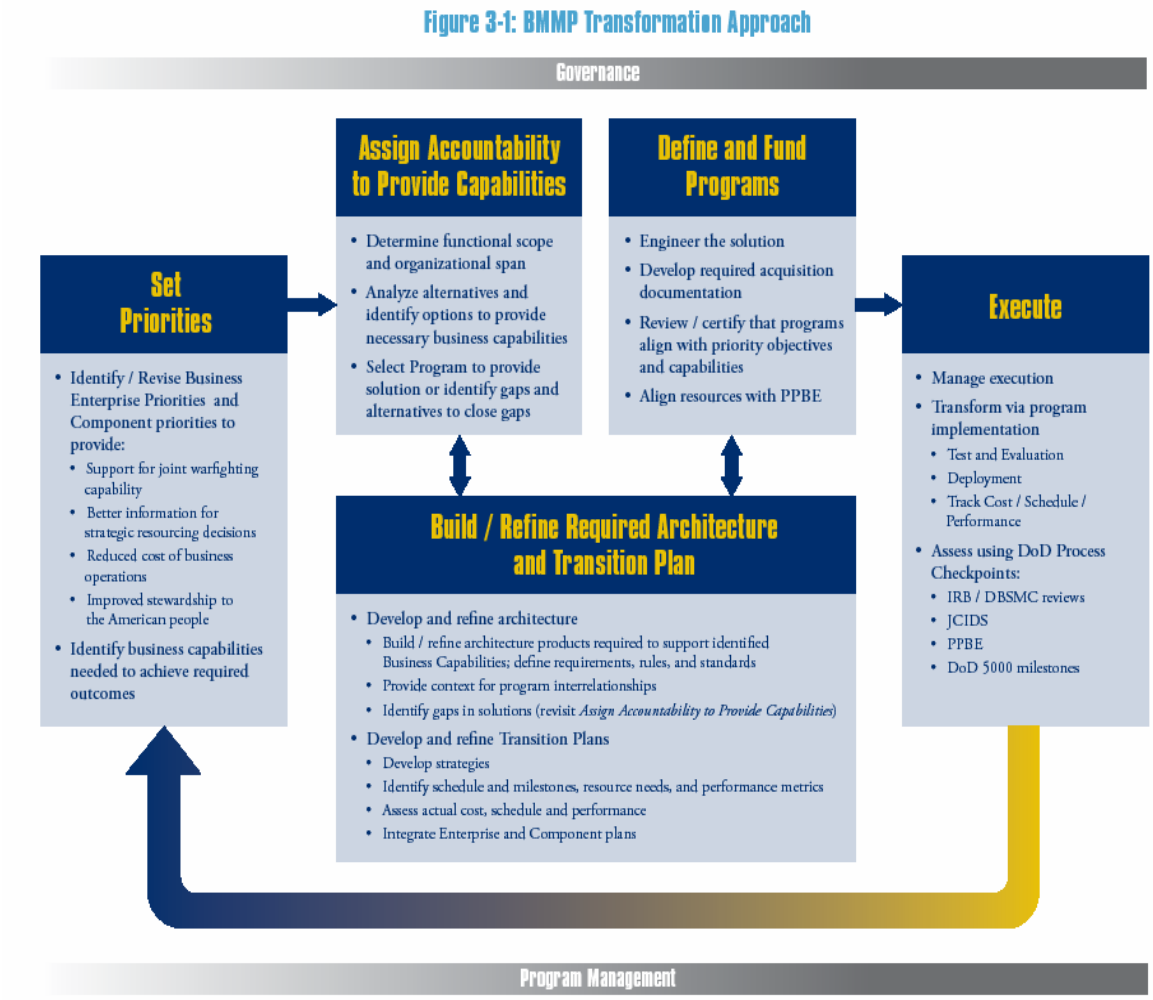

Figure 4-1. BMMP TRANSFORMATION APPROACH ("DOD ETP" 39)

2. Business Enterprise Architecture (BEA)

The BEA is the enterprise architecture the DOD is developing to guide its business transformation. It is considered to be the blueprint or key to the DOD

transformation. There are four requirements that are guiding the development of the BEA ("BEA…"):

- Support joint warfighting capability.
- Enable rapid access to information for strategic resourcing decisions.
- Reduce the cost of defense business operations.
- Improve stewardship to the American people making it easier to trace purchases and review investment decisions thoroughly.

The BEA is further described as an outcome-focused architecture designed to answer real world questions. Five Core Business Missions were designed as the framework to support both horizontally and vertically the functional areas of the BEA and Business Enterprise Priorities ("BEA…"):

- Linkage with the Federal Enterprise Architecture.
- Net-centricity across the DOD.
- Standardization of data, business rules, processes, terms, and capabilities.
- Application of government and industry standards.
- A repeatable, structured methodology.

Navy ERP is going to be integrated into the DOD BEA sometime in the future. The problem, as identified by the CBO report GAO-05-858, is that Navy ERP is being developed at the same time as the BEA. Without having a well-designed BEA with restrictions and requirements, can the Navy ERP be considered successful later on if it requires rework to comply?

3. Enterprise Transition Plan (ETP)

The Enterprise Transition Plan (ETP) is a document furnished by the DOD transition team and is a management tool used by the different services. It includes transformation plans, schedules and budgets as input by the respective services and departments. The report is approved by the SECDEF and the latest update to the ETP was in March 2006.

4. Business Enterprise Priorities (BEPs)

There are six enterprise priorities called BEPs outlined in the ETP. "They are designed to deliver business value to the joint warfighter and a targeted set of business capabilities for the DOD" ("DOD ETP" vii):

- Personnel Visibility: provide access to reliable, timely and accurate information.

- Acquisition Visibility: provide access to acquisition information critical to lifecycle management.
- Common Supplier Engagement: provide a simplified way for DOD personnel to interact with commercial and government suppliers.
- Material Visibility: improve supply-chain performance.
- Real property Accountability: provide near real-time information on DOD property and assets.
- Financial Visibility: provide immediate access to accurate and reliable financial information.

Each of the services is expected to support the transition plan and the six priorities outlined. By supporting the BEP as outlined within the ETP, along with their own transformation efforts including ERP, the services should enable the DOD to transform.

5. Defense Business Systems Management Committee (DBSMC)

The DBSMC was established in February 2005 to ensure executive-level involvement and meets monthly. The senior member is the Deputy Secretary of Defense. It is the senior-level committee for business transformation, and it approves all BEA updates and ETP releases.

6. Business Transformation Agency (BTA)

The BTA was established by the Deputy Secretary of Defense in October 2005. The mission of the agency is, "to transform business operations to achieve improved warfighter support while enabling financial accountability across the Department of Defense ("Status of DOD…" 71)." The agency operates under authority of the Under

Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)). Day to day direction, management and oversight is provided by a cooperative effort between the Deputy Under Secretary of Defense for Business Transformation (DUSD(BT)) and the Deputy Under Secretary of Defense for Financial Management (DUSD(FM)). The BTA is composed of the following seven divisions ("Status of DOD…" 71-72):

- Defense Business Systems Acquisition Executive (DBSAE): The Component Acquisition Executive for DOD Enterprise-level systems.

- Transformation Planning and Performance: Maintains and updates the BEA and corresponding ETP and ensures enterprise and transition milestones are met and documented per the ETP. Has a dedicated team, the Enterprise Integration Team (EI), that is specific to ERP efforts for all services.
- Transformation Priorities and Requirements: Provides a link between the OSD and Principal Staff Assistants.
- Investment Management: Oversees defense business systems investments across DOD.
- Warfighter Support: Identifies urgent Enterprise-level business issues directly impacting the warfighter and is responsible to resolve issues as rapidly as possible.
- Information and Federation Strategy: Manages the BTA information strategy to include strategic planning, change management and technology visioning.
- Agency operations: Provides the administrative support to the BTA.

7. Investment Review Boards (IRBs)

The IRBs review every major business investment and provide review board advice and recommendations to the DBSMC. They are also responsible for certification recommendations to appropriate certifying agencies. As of February 2006, the IRBs had approved investment and certification to 226 systems ("Status of DOD…" 6)."

8. Enterprise Integration (EI)

This team is part of the BTA, but is considered so integral to linking the Navy ERP program into the DOD BEA that it is being mentioned separately here. On February 3, 2006, the EI Team was given direct responsibility for ERP efforts across the DOD. The team is headed by the Defense Enterprise Integration Executive (DEIE) (Brinkley):

> Specifically, this office will ensure that best practices are leveraged across DOD ERP implementation initiatives, will work to ensure rapid adoption of DOD-wide information and process standards as defined in the BEA, and will work to eliminate any burdensome processes that hinder successful, rapid deployment of ERP capabilities within the components.

C. NAVY ERP IS JUST ONE PART OF THE NAVY TRANSFORMATION

Transformation is the way of the future for the Navy, and leadership has developed new vision statements for the Navy overall. New business transformation goals have been developed since BMMP was established and are stated in the DOD Enterprise Transition Plan (ETP). The Navy's ERP program is a big part of the Navy's business transformation and just as the DOD has oversight committees and goals, so does the Navy. A brief introduction to the major transformational programs, committees and goals within the Navy that relate to Navy ERP are as follows:

1. Naval Power 21

It is the Navy keystone vision document and characterizes naval forces with four fundamental qualities ("DOD ETP" 84):

- Decisiveness: Every element of the Navy-Marine Corps team will be well equipped, organized, and trained to bring decisive effects to bear against our adversaries.
- Sustainability: We are capable of arriving quickly and remaining on-scene for extended periods.
- Responsiveness: Naval forces operate around the globe, around the clock. Operating from the sea, we are free of basing or permission constraints.
- Agility: Our flexible organization enables scalability to the requirements of any situation.

2. Sea Power 21

"Defines the Navy with three fundamental operational concepts: Sea Strike, Sea Basing, and Sea Shield, enabled by an information technology component called FORCEnet." Combined, they give the Navy the ability to project offensive and defensive power with operational ease around the world. It is comprised of five core concepts ("DOD ETP" 85):

- Sea Basing: Projects the sovereignty of the U.S.
- FORCEnet: An architectural construct designed to include standard joint protocols, common data packages, seamless interoperability, and strengthened security, to enable swift and effective use of information that is foundational to Sea Power 21 and Naval power 21.
- Sea Warrior: The process of developing twenty-first century Sailors.
- Sea Trial: The continual process of concept and technology development.
- Sea Enterprise: Promotes incorporation of change to more efficient methods of doing business through reengineering and incorporation of new technologies.

3. The Navy's Business Transformation Vision

The Navy's business transformation vision is "to significantly increase readiness, effectiveness, and availability of warfighting forces by (a) employing business process change to create more effective operations at reduced costs, and (b) exploiting process improvements, technology enhancements, and an effective human capital strategy to ensure continued mission superiority ("DOD ETP" 83)."

4. Department of the Navy Transformational Council

This is the senior organization within the DON and was developed to oversee all aspects of the Navy transformation process. It is chaired by the Under Secretary of the Navy and includes the Vice Chief of Naval operations (VCNO), the Assistant Commandant of the Marine Corps, Assistant Secretary of the Navy and the Chief Information Officer, and other executive leadership as required ("DOD ETP" 95).

5. Functional Area Managers (FAMs)

These are the managers that work directly with DOD counterparts to ensure alignment with DOD core business areas such as BMMP and the BEA. The Navy has 23

FAMs responsible for various programs. The Navy ERP program belongs to the Enterprise Services FAM and he works with the DOD EI on ERP issues.

6. Navy ERP Program Office

In 2003, the ERP program office was developed to take the Navy pilot programs and integrate them so they could become one large ERP program for use Navy-wide. Ronald Rosenthal is the Program Manager (PM) and is responsible for coordinating ERP activities within the Navy. The Navy ERP website is http://www.erp.navy.mil.

7. The Navy Convergence Team

Even before all of the Navy ERP pilots went live, it was recognized by the Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RDA)) that the programs would need to be integrated into one program. In August 2002, he directed the convergence of the four programs. In September 2002, the Navy Enterprise Resource Planning (ERP) Convergence Team (NECT) was established to get things moving in the right direction. Specifically, the NECT was to:

- Develop a convergence plan for the Navy.
- Identify and document common business processes and unique business processes.
- Identify and document those areas where statute or regulation precludes common process.
- Coordinate Navy ERP architecture with other Navy and Departmental initiatives.
- Develop a Navy ERP acquisition strategy.
- Maximize reuse and integration of existing Navy-related ERP documentation and resources ("SECNAV Convergence…" 28).

D. THE SUCCESS OF THE PILOTS

The Navy, the DOD and the SECDEF decided the ERP pilots were successful as early as 2003, and by mid-2004 the ERP program was moving towards full acquisition and implementation. By September 2005, the Navy ERP program attained Milestones A and B. As mentioned in chapter 3, the CBO report in September 2005 considered the

pilots failures. Because of this disagreement between the two organizations, the following summary of pilot program successes is presented. They were taken directly from the Department of the Navy chapter of the September 3, 2005 DOD ETP so that an attempt can be made at understanding some of the metrics the DOD and Navy leadership were using when the pilots were determined to be successful ("DOD ETP" 91-92).

1. SPAWAR Project CABRILLO: Financial Management

CABRILLO achieved a fifty percent reduction in the cost of business systems support and reduced acquisition requisition-to-order processing time from 44 days to 44 minutes.

2. NAVSEA Project NEMAIS: Regional Maintenance

Fleet maintenance activities reduced average total repair times by sixteen percent and totally eliminated job rejection notification time. Prior to NEMAIS, these notifications took an average 20 days to process.

3. NAVAIR Project SIGMA: Program Management

NAVAIR decreased financial statement processing time by 66 percent and cut engineering change proposal approval times by an average 87 days to 25 days. SIGMA also received the 2005 America's SAP Users Group (ASUG) Impact Award for recognizing strategic business results.

4. NAVSUP/NAVAIR Project SMART: Supply

Processed over one million parts inventory transactions with an error rate of less than one half of one percent and lowered warehouse refusal rate from 3.5 percent to 0.5 percent. "Based upon these successful demonstrations of COTS ERP suitability for military use in these functional areas, the DON decided to adopt ERP, converge the pilots into a single program, and expand the ERP to optimize business processes across the Navy enterprise ("DOD ETP" 92)."

There are more success stories that can be found from the four organizations that participated in the pilots, but the point here is that the pilots did what they were designed to do and culminated in a go decision for full implementation. Figure 4-2 summarizes the history of the Navy ERP efforts to 2004.

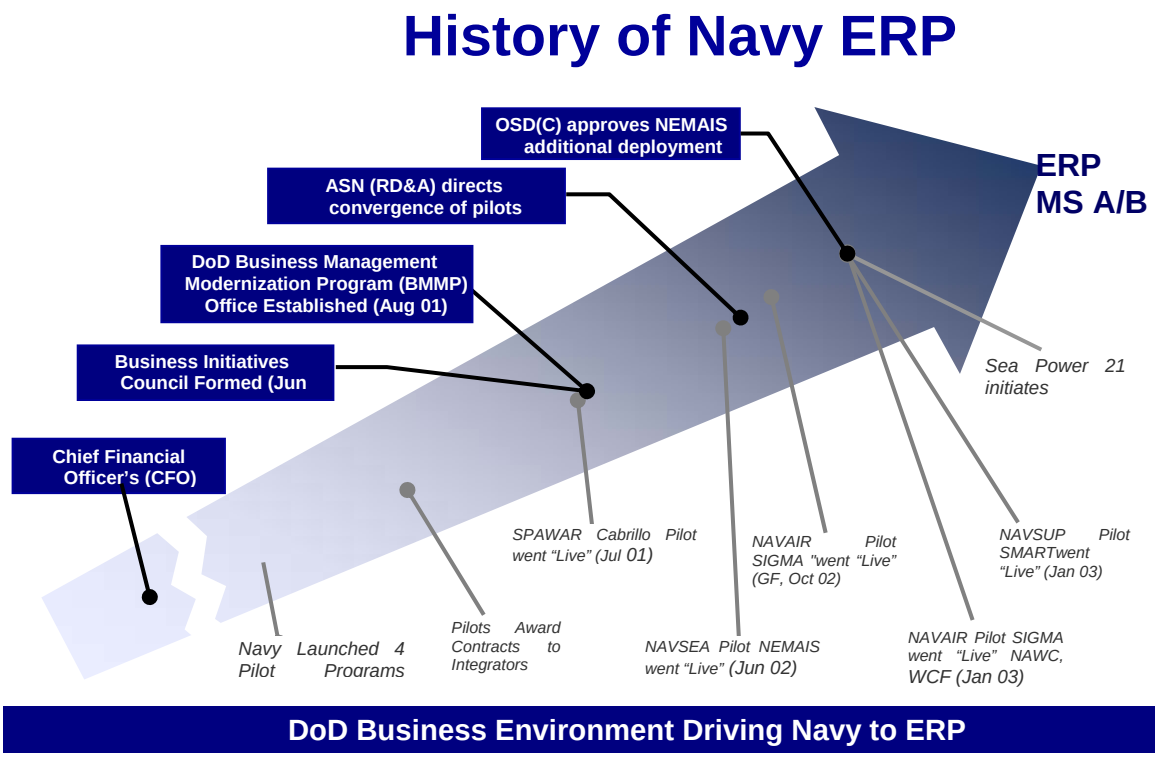

Figure 4-2 HISTORY OF NAVY ERP (Hutsenpillar 9)

E. THE DECISION FOR ONE ERP

The pilots proved that COTS could work in the military environment on an individual organization level, and in late 2002, even before all four pilots went live, it was mandated that the programs integrate. Integration had been considered the entire time with the early establishment of the HIT followed by the ICB, but they were geared towards implementation training and lessons learned as each pilot developed individually. The full integration of the four pilots created new challenges as well as a requirement for everyone to use the same software.

1. The Decision to Converge

In late 2002, the SECNAV directed the convergence of the four pilot programs. The CNO concurred and the mission for Navy ERP was established with the requirement to reinvent and standardize the Navy business processes for acquisition, financial and logistics operations. Four key program objectives were developed (Hennessey 6):

- Build an integrated financial system that complies with Failure Mode and Effects Analysis (FMEA) requirements for all Navy commands.

- Optimize end-to-end value chains across functional and organizational boundaries.
- Collapse the pilot programs to produce a single product for the Navy.
- Maximize ROI through effective deployments and sequencing of functionality.

Figure 4-3 depicts the convergence strategy for the Navy.

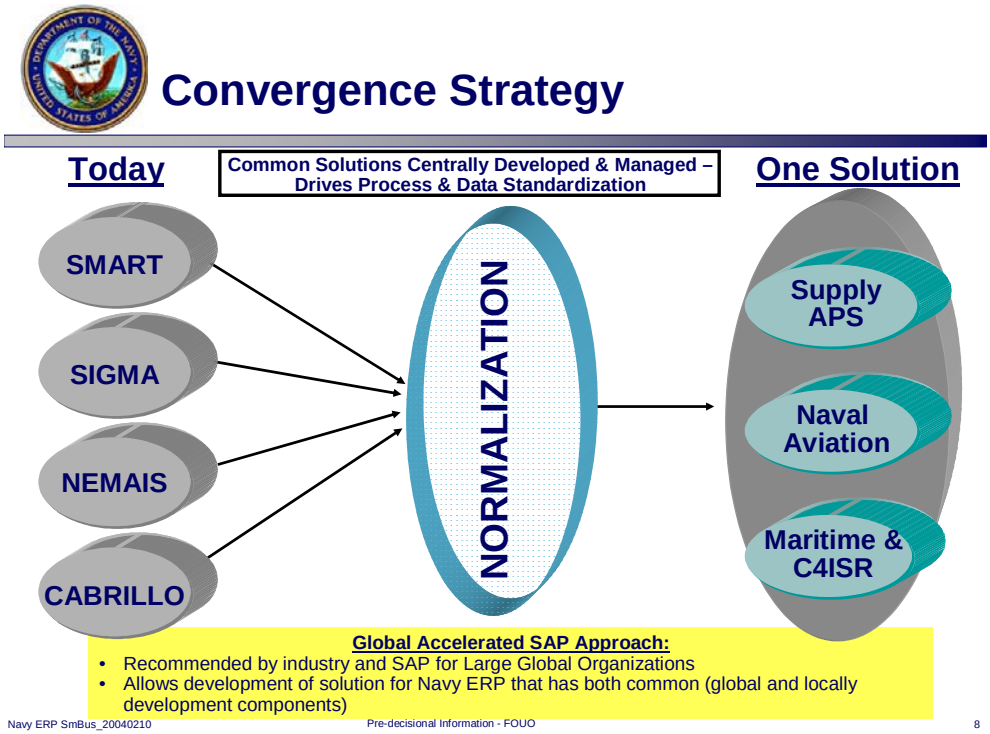

Figure 4-3 NAVY ERP CONVERGENCE STRATEGY (Fitzpatrick 14)

2. Convergence Challenges

The four pilots were developed with SAP software, but they used different integrating contractors, and each program individualized their ERP solutions. How to merge four different solutions into one became the obvious question. The Navy identified four significant challenges (Hennessy 13):

- Each of the four pilots had separate integration contracts and providers, so they weren't using identical architecture.
- The contractors being used each had different capabilities and knowledge. How do you choose the best?

- Each of the pilots had different levels of performance during different periods. Which application is best?
- The pilots are scattered around the country: San Diego, Norfolk, Mechanicsburg and Patuxent River. Where do we start?

Considering all of the challenges they faced, Navy leadership decided to start over with one COTS software provider and a single Program Manager.

3. The Solution

SAP was already intimately familiar with all four of the pilots, so the Navy chose SAP to provide the software to the Navy ERP Program. The COTS software decided upon was the mySAP Business Suite family of business solutions with R/3 functionality, which was used to some extent in the pilots, but is significantly more robust than the functionality used in the pilots ("SAP Customer Success…"). SAP will provide the Navy guidance and provide subject experts on COTS throughout the convergence process.

The Navy also realized that one integrating contractor had to be responsible for tracking solution development and migrations of system efforts. Enterprise Integration, Inc./IDS Scheer (EI) was chosen with SAP concurrence and GAO approval. Integration as previously mentioned is going to be a significant challenge and figure 4-4 is EI's depiction of the various implementation domain relationships and requirements, Navy and OSD, the Navy will have to work through.

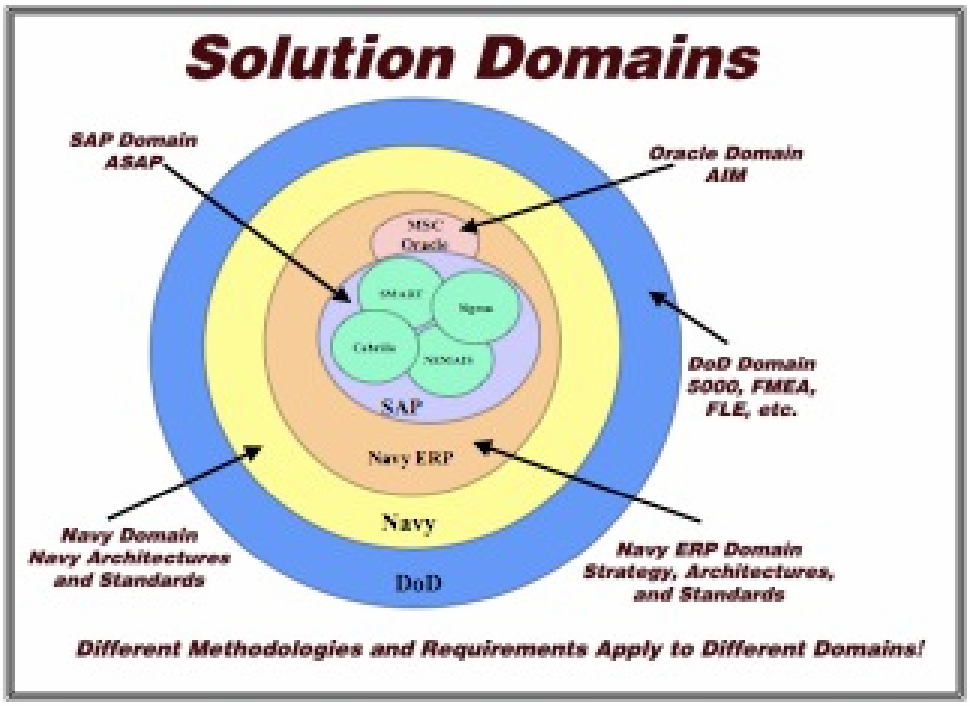

Figure 4-4 EXTERNAL REQUIREMENTS CONSTRAINING IMPLEMENTATION ("The Navy ERP Architecture" 15)

F. MIGRATION OF SYSTEMS

Part of the convergence effort is the migration of systems across the Navy and DOD. According to the September 2005 GAO report, the first deployment of Navy ERP will require interfaces that permit ERP to communicate with 27 Navy-specific systems and 17 DOD systems ("DOD Business…GAO-05-858" 35). Failure to get these interfaces will probably lead the GAO to a similar conclusion as already discussed in Chapter 3. Figure 4-5 shows the Navy and DOD systems the GAO expects the Navy ERP to achieve.

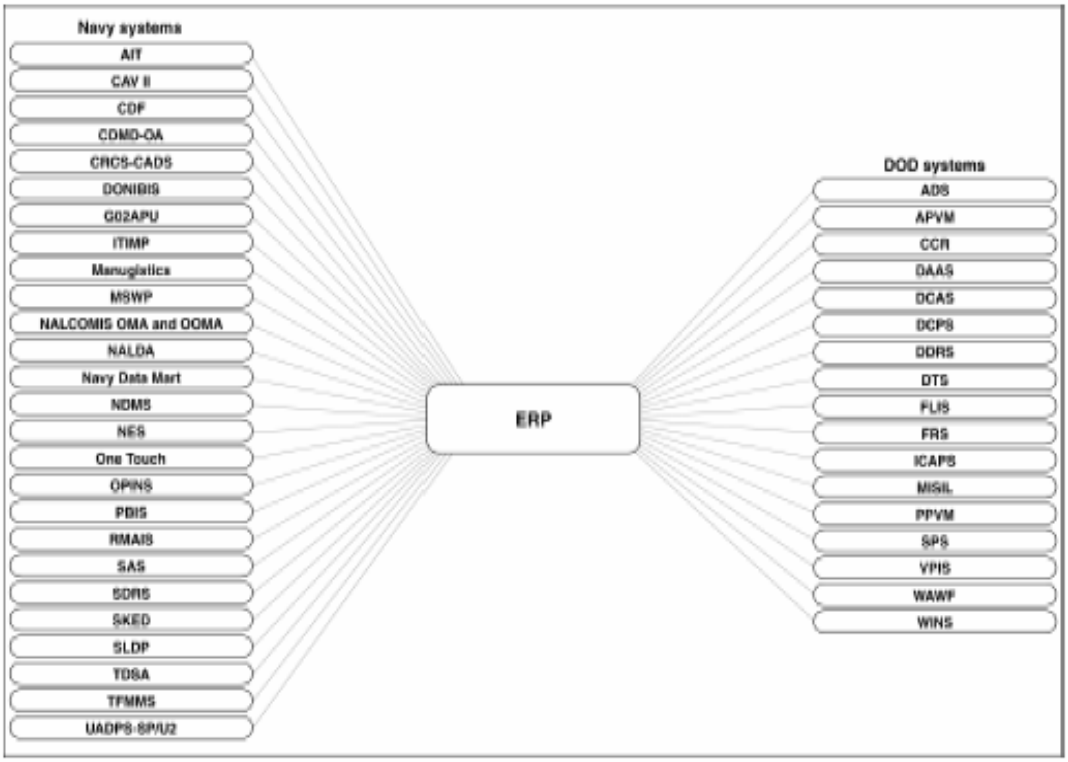

Figure 4-5 NAVY ERP REQUIRED SYTEMS INTERFACES ("DOD Business…GAO-05-858" 35)

G. ERP ACQUISTION STRATEGY AND COST

1. The Acquisition Strategy

The new program office was stood up in 2003, and Navy ERP became an ACAT 1 program in September 2004 with Milestones A and B being achieved. Figure 4-6 summarizes the Navy ERP migration and milestones summary submitted to Congress in the March 2006 ETP.

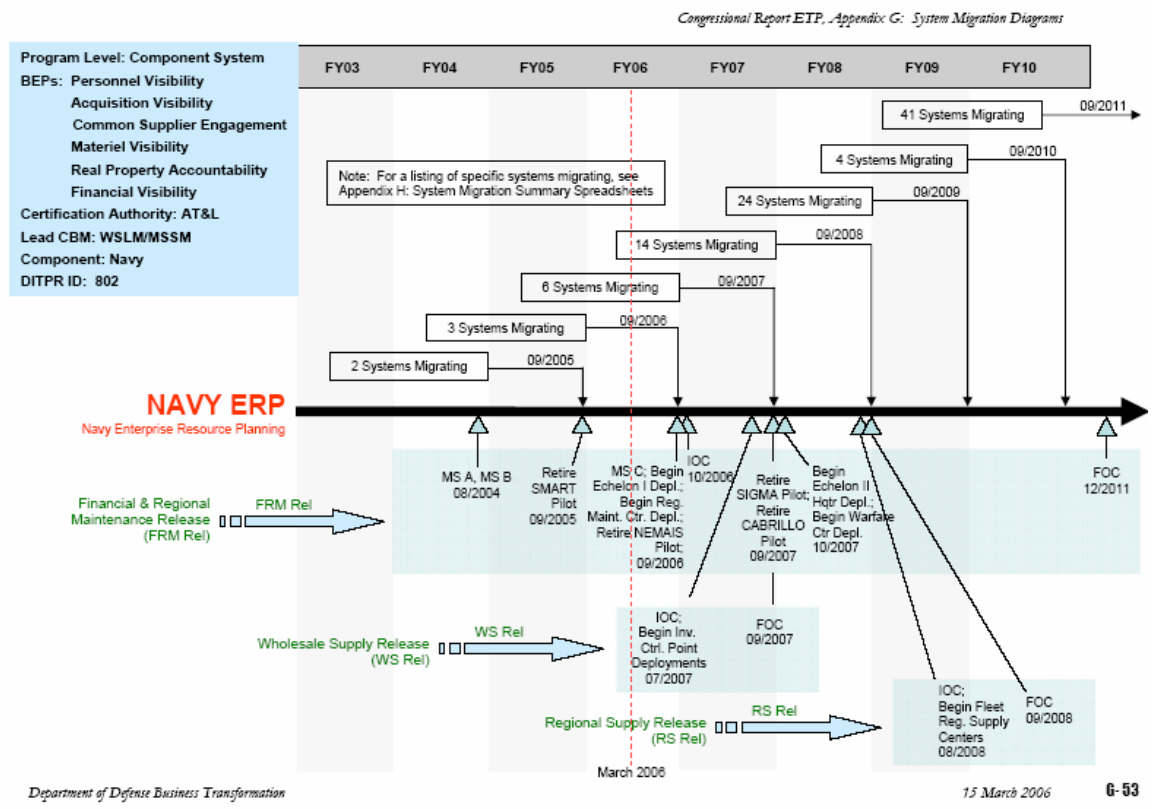

Figure 4-6 NAVY ERP SYSTEM MIGRATION DIAGRAM ("Status of Department…" Appendix G-53)

Note in Figure 4-6 that Milestone A and B were achieved in August 2004 and the retirement of the SMART pilot occurred in September 2005. Milestone C and the retirement of NEMAIS are expected in late 2006, and SIGMA and CABRILLO are to be retired in 2007.

2. Program Costs

Common knowledge is that ERP systems cost a lot of money and the Navy is expected, according to Congressional report GAO-05-858, to spend $800 million dollars on the program from 2004-2011. Further research uncovered varying sources with different dollar figures, but they all came in close to $1 billion, and because ERP programs typically go over their initial budget inputs, one should expect the program to exceed $1 billion. The most recent cost data available is presented in figure 4-7 and comes directly from the March ETP update to Congress.

Component	Component Systems and Initiatives	Objective	Program Milestones Milestone	Date	Cost and Migration	FY05 & Earlier	FY06	FY07
NAVY	**Navy ERP** Navy Enterprise Resource Planning	The Navy ERP program will provide a standard set of tools to Navy organizations to facilitate business process reengineering and provide interoperable data for acquisition financial, and logistics operations. Navy ERP will be a major component of the Navy's Global Combat Support System Family of Systems and provide a critical link between operating forces and the Navy's support echelons. The program will: - Reduce the overall Navy costs by applying proven industry best practices and processes and replacing legacy IT systems. - Facilitate an end-to-end solution for receiving requests for resources and processing them to fulfillment. - Replace stove-piped systems used for financial management, personnel management, inventory management, and industrial operations with an integrated system. - Enable rapid response to operating force logistics needs through integrated visibility and status data. The ERP program will transform business activities into an integrated network of decision-making processes and activities. Through application of industry best practices and processes predefined in the ERP software, Navy organizations will be able to leverage proven practices and procedures. Note that the budget numbers presented include the budgets for the Navy ERP pilot programs.	**Increment: Financial & Regional Maintenance Release** Milestone A Milestone B Retire SMART Pilot Milestone C Retire NEMAIS Pilot IOC Retire SIGMA & CABRILLO Pilots FOC **Increment: Regional Supply Release** IOC FOC **Increment: Wholesale Supply Release** IOC FOC	 6/2004 6/2004 9/2005 9/2006 9/2006 10/2006 9/2007 12/2011 6/2008 9/2008 7/2007 9/2007	# Systems Migrated	2	3	6
					Budget *see note 4*		186.1	236.0
					Actual	1,238.6		
	NMCI*	The NMCI initiative's principle objective is to replace numerous independent and disparate networks ashore with a single secure network, interfaced with ISNS (afloat), One Net (ashore OUTCONUS) and the Marine Corps Enterprise Network to provide a secure, seamless, interoperable IM/IT infrastructure as the transport layer for transformed business practices.	IOC FOC	5/2002 6/2006	Budget		1,602.6	1,681.5
	Navy Marine Corps Intranet				Actual	4,155.0		

Figure 4-7 NAVY ERP PROGRAM MILESTONES AND COST SUMARY ("Status of the Department…" Appendix B-12)

V. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The Department of Defense (DOD) and the Department of the Navy (DON) have been under pressure to streamline their business practices and align with the commercial sector for many years. The Chief Financial Officer's Act of 1990 directed the services to provide annual financial statements using generally accepted accounting terms, and none have been able to comply, but many initiatives and oversight programs have been instituted to help meet the objective. The Navy established a steering group in 1997 to recommend possible solutions, and their recommendation was the adoption of Enterprise Resource Planning (ERP) using Commercial Off the Shelf (COTS) software. Four pilot programs were conducted, three of which are still going, and they were and are still considered to be successful by DOD and Navy leadership. However, they were considered failures by Congress for several reasons presented in chapter 3, with the two main reasons being that the pilots were developed individually and without DOD oversight. These failures caused the Navy to develop a new program in 2004, so the $1 billion already spent on the pilots was a waste ("DOD Business…GAO-05-858" 12). Following the Navy consensus that the pilots were successful, the Navy decided to converge the pilots and develop one ERP solution. This project was conducted as a case analysis of the Navy's ERP efforts from the decision to adopt ERP up to the current Navy ERP program. The objective of this report was to develop a single-source document which provides the reader with enough information to have an understanding of the ERP efforts within the Navy, understand why the Navy decided to implement ERP, understand the oversight which affects ERP implementation, and finally, decide for themselves if indeed ERP is good for the Navy.

B. CONCLUSION

The Navy ERP program is going to be an expensive undertaking, and DOD is supportive of the effort. Congress, however, is not convinced that the program will be successful, and their 2005 reports detail specifically what it is they do not like about the program. Whether or not the ERP pilot programs were actually successful is dependent

on individual interpretation, but nevertheless they ended with a decision to continue COTS software implementation and a much larger ERP effort by the Navy. The ACAT 1 program was established in 2004 and is expected to run through 2011 at a cost of $800 million dollars. Success depends on how well the Navy meets the many challenges of COTS implementation and the challenges imposed by federal financial management requirements. Secretary of Defense Rumsfeld is steadfast in his desire to update the DOD's business processes, and it is not likely he will accept failure as an option.

C. RECOMMENDATIONS

The Revolution in Business Affairs (RBA) is slowly becoming a reality for the Navy. ERP is going to be a part of it, the pilots proved it could be done, but the challenges the new program faces are significantly greater than that of the pilots. How each challenge is handled will be critical to the implementation effort and future funding.

Success will be measured in a variety of ways, but the minimum standard expected will be alignment with the Business Management Modernization Program (BMMP) and the DOD Business Enterprise Architecture (BEA). The obvious keys to success are following ERP best business practices, which are common knowledge with integrators and COTS suppliers, and using lessons learned from the pilot programs. Additionally, the program will have to survive the test of time because it will take a long time to get results and cover multiple presidential administration changes.

Given that common best practices are highly recommended for any COTS implementation, the following recommendations are specific to the Navy ERP program and are not only provided for program implementation success, but for convincing Congress that the program will be successful:

- As the ERP program develops, constant BMMP alignment must be assured with DOD involvement and oversight. The BMMP has specific guidelines and capabilities that are expected for future reporting purposes and changing the COTS software will be impossible later.
- The Enterprise Integration team was established for the purpose of ensuring the BEA and the ERP program interface correctly, so the Program Managers for both entities must work together as a team. The BEA is being developed

concurrently with the ERP program, yet the ERP program has to interface with it when it is completed, and Congress specifically mentioned this as a problem they anticipate.

- Develop metrics with Congressional oversight. Although understandably not easy to do, Congress has to approve the program into the future and currently they are not fond of it because there are no metrics available to establish success.
- Integrate the pilots with one COTS provider and have one committee or organization in charge of all decisions and disputes. The pilots also proved that separate organizations could start with the same COTS software, and end up with different solutions that will not interface. The ERP Program is currently designed this way, and the recommendation is that the Program Manager be the problem/integration resolution chairman
- Congress identified the DOD–Navy systems they expect Navy ERP to interface with, figure 4-5, so the ERP Program Manager should consider those as specific metrics and correct or address them as implementation allows.

D. AREAS FOR FURTHER RESEARCH

The purpose of this project was to give a broad overview of the Navy ERP efforts from the time the idea was conceived to the current program. The research did raise some questions and potential areas for additional research that were not addressed. Further questions that could be addressed and researched are:

- How does the Navy plan to address the ERP challenge of concurrent development with the DOD BEA?
- All of the services are developing ERP programs of their own. They are not using the same COTS software or integrating contractors. Is BMMP supposed to interface with four or more separate solutions, and how do they plan to integrate them? How does this situation relate to the four pilots the Navy conducted, and why doesn't Secretary of Defense Rumsfeld recognize it? What about Congress?

- Developing metrics that would be consistent for all implementations seems extremely difficult. What are the metrics?
- Is there too much Congressional oversight into pilot programs within the DOD?

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